

A Report on the
PRELIMINARY INVESTIGATIONS
INTO THE
OCCURRENCE OF
METALS AND ARSENIC
IN DRINKING WATER SUPPLIES
OF THE TRI-TOWN AREA

April 1977

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OF THE TRI-TOWN AREA

April 1977
Municipal & Private Abatement
Northeastern Region
Ministry of the Environment

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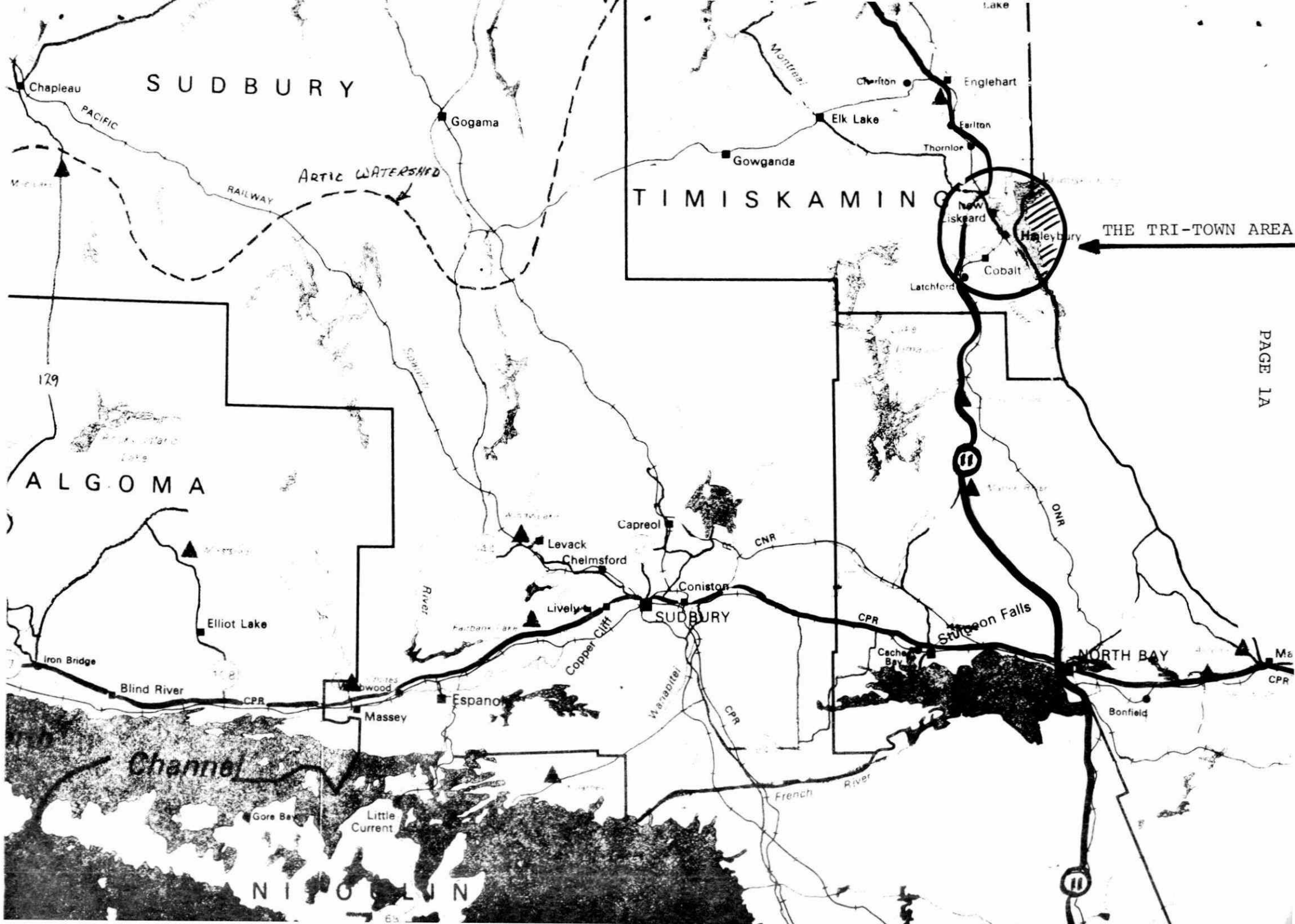
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Map #1 - Location of Sample Supplies Tri-Town Area

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PURPOSE

To determine if drinking water in private and public water supplies in the Tri-town area is being chemically contaminated.



INTRODUCTION

In 1903, a series of events in an area near the northeastern portion of Lake Timiskaming led to one of Canada's most famous mining discoveries.

During the construction of a railway between North Bay and the rich agricultural lands of the Lake Timiskaming area, two contractors supplying ties for the railway noticed the gleam of metallic flakes on a rock outcrop at the southeast end of Long Lake, later re-named Cobalt Lake. Assay reports on rock samples they collected revealed phenomenal concentrations of native silver. News of the discovery led to a tremendous mining boom and almost overnight the town of Cobalt sprang into existence. The bonanza years lasted from 1904 to about 1930 at which time silver production went into a gradual decline. The camp experienced a rejuvenation in silver mining in the 1960's, but now there are only three companies conducting mining and milling operations.

There are three towns located in the vicinity - Cobalt, Haileybury and New Liskeard. These communities and the ten surrounding townships comprise what is referred to as the Tri-Town area. This area, located approximately 250 miles north of Toronto, contains about half the population of the District of Timiskaming. About a quarter of the Tri-Town population lives outside of the three principal municipalities. Throughout the area mining activity has been interspersed with agricultural, recreational and residential development.

Tremendous amounts of arsenic-bearing tailings (waste crushed rock from which the ore minerals have been extracted) have resulted from the mining operations conducted since the turn of the century. Until recent years, there has been an absence of proper control over the tailings discharges and many small watercourses in the area have been affected by the massive tailings deposits.

In 1975, M.A. Rychlo, North Bay District Officer of the Ministry's Industrial Abatement Section, initiated a detailed surface water quality and sediment survey program, and an extensive investigation of geological and geochemical information relevant to the Tri-Town area. As a result of these investigations, the potential of arsenic and heavy metals contamination of private and public water supplies, arising naturally as well as from industrial contamination was demonstrated. Consequently, that same year Municipal and Private Abatement staff conducted a comprehensive sampling program to determine the metal and arsenic levels of communal and private water supplies in the area.

SUMMARY OF FIELD WORK

1. Ground Water Sampling in the Farr Creek Drainage Basin.

Preliminary investigations by Municipal and Private Abatement staff in December of 1975 established that one of the six supplies sampled in the Farr Creek drainage basin, had an excessive arsenic level. (See Appendix I). This supply commonly known as the Giroux Lake well had an arsenic level of 0.76 mg/l (well above the Ministry's maximum permissible level of 0.05 mg/l). The Medical Officer of Health was notified and soon after the well was condemned and placarded as unfit for consumption.

During this survey, the well at Mileage 104 (approximately 2 miles north of Cobalt on Highway #11-B) was sampled. Although this shallow well (equipped with a hand pump) is within 300 feet of Farr Creek which has had arsenic levels in the water of up to 3.3 mg/l and in the sediments of up to 1,400 mg/l, the water sample arsenic level of 0.005 mg/l was within the Ministry objective of 0.01 mg/l arsenic. This well has had a history of adverse bacteriological results and has been posted by the Timiskaming Health Unit as being unsafe for human consumption.

The result at the Giroux Lake well confirmed the potential danger so a sampling of all municipal water supplies was immediately undertaken.

2. Municipal Water Supply Sampling in the Tri-Town Area.

The first concern was to ensure that all public supplies, did not have levels of metals and arsenic above the Ministry's objectives. Throughout the spring of 1976, water from these five municipal supplies was tested for lead, zinc, arsenic, cobalt, silver, nickel and cadmium.

<u>WATER WORKS</u>	<u>SOURCE</u>
Cobalt	Lake Sasaginaga
Haileybury	Lake Timiskaming
New Liskeard	Drilled wells
Latchford	Montreal River
Dymond Township	Drilled well

All results proved to be within the Ministry's objectives (Appendix I) and confirmed that the municipal systems were supplying safe water to their consumers.

There had been concern that the Haileybury and Cobalt systems might have elevated metals or arsenic levels because:

1. Haileybury's water intake into Lake Timiskaming is approximately one mile from the mouth of Farr Creek. This creek is the outlet of the drainage systems for the various lakes in the area which have been used for disposal of mine tailings. Water samples from the creek have had arsenic levels ranging from 0.42 mg/l to 1.1 mg/l, and elevated metals levels.
2. Cobalt's water works draws water from Sasaginaga Lake. Sediment samples from this lake have arsenic levels as high as 85.0 mg/l and elevated metals levels. One water sample taken from the lake in 1974 demonstrated an elevated arsenic level of 0.04 mg/l.
3. Sampling Large Private Water Supplies in the Tri-Town Area

With assurance that all municipal supplies were well within Ministry guidelines, this second group of water users was sampled: all motel, hotel, campsites and trailer parks on private but communal systems. Of the eight (8) large private and twelve (12) individual supplies sampled in August of 1976, two (2) from private residences produced water with arsenic levels above 0.01 mg/l. (See Appendix I). The sample from the supply of Mr. W.B. Verdon in the Sasaginaga Lake area contained 0.017 mg/l arsenic. The sample from Mr. J. Ward's supply (on Hwy #567, 5 miles from North Cobalt) contained 0.022 mg/l arsenic.

4. Sampling Private Water Supplies in the Tri-Town Area
August 11/76

During a review of literature on the area's Geology, Industrial Abatement staff discovered that the 1966 Geological Report indicated that water flowing from an inclined borehole on the shore of Lake Timiskaming contained a high level of arsenic. District staff set out on August 11, 1976 to find and re-sample this water and discovered that the borehole, located in the eastern corner of the Town of Haileybury's Bucke Township Park, had been developed as the water supply for the campgrounds and canteen of this park. The samples taken on August 11, 1976 contained arsenic of 4.4 mg/l (almost 90 times this Ministry's rejection limit).

As soon as Ministry Staff were notified of the excessive arsenic levels in the Bucke Township Park supply, the Town of Haileybury, the system owners and the Timiskaming District Health Unit were notified of the potential danger.

As soon as the Council of the Town of Haileybury was notified of the arsenic levels in the water in the Bucke Township Park supply, they disconnected the pump and shut off the supply. The water continues to flow from the borehole and into Lake Timiskaming. Council have requested the Ministry's assistance in determining how to go about obtaining a safe water supply for the park.

During that same field trip, four additional private water supplies were sampled, either as a result of a specific request by the owner, or they were supplies that were just thought to be the inclined borehole. These four supplies proved to have arsenic levels well within the Ministry's acceptable limits. Sample Results Summarized in Appendix I.

5. Sampling Private Water Supplies in the Tri-Town Area
November 1976

The 4.4 mg/l arsenic level of the Bucke Township supply, reinforced the concept of collecting samples from all private supplies in the aforementioned areas, to ensure that residents could be advised of any drinking water contamination.

In November 1976, an intensive study and sampling program was directed at all residences within selected areas corresponding to specific known geological formations (Coleman, Keewatin and one area in the Nipissing formation). These Coleman and Keewatin formations contain known mineralization areas where high arsenic levels have been found by geologists of the Geological Survey of Canada. The one area in the Nipissing formation was selected on the assumption that any bedrock geochemical influence would be minimal because of the lack of known mineralization in this formation.

Information on well depths, types of wells and number of persons using each supply was also obtained during the sampling program. The November private water supply survey encompassed areas of the Townships of:

Dymond	-	5 samples
Harris	-	8 samples
Casey	-	5 samples
Firstbrooke	-	7 samples
Bucke	-	63 samples
Coleman	-	43 samples
Gillies Limit	-	1 sample
Lorraine	-	10 samples
Hudson	-	50 samples

for a total of one hundred and eighty-eight samples (188) from the one hundred and ninety-two (192) private dwellings contacted during the survey (plotted on accompanying maps 2 and 3). The sample results have been segregated by township and are presented as Appendix II.

6. Re-Sampling of Supplies with Detectable Contaminants
December 1976

In the November 1976 investigations of private water supplies, a sample from a residence located within a housing development adjacent to the Old Cobalt Refinery contained 0.037 mg/l arsenic. It was later determined that this house was supplied by a communal water supply system owned and operated by the Refinery. The water is pumped from one of two 30' drilled wells on the refinery property into the elevated reservoir. From this storage the water flows through a distribution system to the sixteen residences. The Ministry has since met with the parties responsible for the water supply and requested all families taking water from the system be notified of the sample results. The owners have been requested to monitor the supply on a monthly basis and notify the Ministry of the results.

On January 14, 1977 a re-sampling of the thirty (30) supplies with detectable Arsenic and Metals levels began. Of these supplies twenty-three (23) were re-sampled. The remaining supplies were not sampled because they were closed for the winter or the supply was frozen.

Since the first phase of our private well water survey of December 1976, three additional individuals have called and asked for their well to be sampled. On March 7th the results of these three (3) indicated two (2) with arsenic levels well within the Ministry's guidelines; however, a drinking water sample originating from an abandoned mine shaft proved to have an arsenic level of 0.06, above our rejection limit of 0.05 mg/l.

SAMPLE RESULTS

(1) Parameters Evaluated

Most of the water samples were analysed for: Arsenic (As), Cadmium (Cd), Cobalt (Co), Lead (Pb), Nickel (Ni), Silver (Ag), and Zinc (Zn) because geologic information indicated the presence of these materials in the area bedrock. Details on the Ministry of the Environment's drinking water objective levels and a brief summary of the health effects of ingesting these constituents are included as Appendix III.

In cases where levels of arsenic or other metals in the drinking water exceed maximum permissible limits, the people were notified immediately by telephone with confirmation by registered mail. A copy of each letter was mailed to the Timiskaming Health Unit. The residents were notified of the analysis results and advised to contact their physician or the Health Unit.

(2) Summary of Private Water Supply Results

There have been two hundred and fourteen (214) private water supplies sampled to date. From the analysis results of these supplies, it is known that:

- six (6) contained Arsenic above this Ministry's recommended rejection level of 0.05 mg/l,
- five (5) additional supplies contained Arsenic above this Ministry's recommended objective of 0.01 mg/l,
- one (1) contained zinc above this Ministry's objective of 5.0 mg/l,
- eight (8) contained detectable levels of zinc but all within the Provincial standards,
- twelve (12) contained detectable levels of lead but all within the Provincial standards.

The February re-sampling of the supplies which demonstrated detectable levels of arsenic, lead, zinc, nickel or cobalt in November, proved that all elevated levels had dropped significantly as outlined below:

<u>Name</u>	<u>Elevated Constituant</u>	<u>Nov.</u>	<u>Feb.</u>
Jones	Cobalt	0.02	0.01
Rudder	Lead	0.01	0.01
Caron	Lead	0.02	0.01
Carriere	Lead	0.02	0.01
Hacquard	Arsenic	0.023	0.008
Willard	Zinc	7.1	0.22
Fillion	Zinc	2.4	0.99
Coleman Twp. office	Lead	0.02	0.02
Littelier	Lead	0.02	0.02
Buckland	Lead	0.02	0.01
Auger	Zinc	4.7	1.6
Hodder	Lead	0.03	0.01
Campsall	Nickel	0.05	0.01
Waugh	Arsenic	0.037	0.025

Most of the supplies re-tested because of high lead and zinc levels during the November sampling were sand points which used galvanized pipe. During the re-sampling the taps were run for over five minutes before the samples were taken. From the lower levels evident in the re-sampling it appears that the elevated lead or zinc levels were produced by the plumbing fixtures and the moderately aggressive water this entire area is known for.

(3) Areas With Suspect Water Supplies

The fifty-seven (57) questionable supplies (Arsenic level over 0.001 mg/l) from the November Survey, appear to be grouped into eight areas. The location and extent of these areas are shown on map #3 and the known characteristics of the questionable supplies in these areas are shown below. (NOTE: The ninety-four (94) non-questionable supplies in these areas are not included). A complete listing of all of the questionable supplies is presented as Appendix V.

Area #1 - "Gillies Depot" (26 Supplies Sampled)

- 5 shallow wells
0' to 30'
Arsenic range 0.001 mg/l to *0.037 mg/l
- 1 deep well
30' to 200'
Arsenic level 0.002 mg/l
- radius one mile to all wells in this group.

*0.037 sample was obtained from the well on the Cobalt Refinery site, one of the known refineries to have considerable amounts of arsenic wastes.

Area #2 - "Cobalt Camp" (10 Supplies Sampled)

- 3 springs
Arsenic range 0.002 mg/l to 0.008 mg/l
- 3 deep wells
30' to 200'
Arsenic range 0.001 mg/l to *0.93 mg/l
- approximate radius of 1.5 miles to all supplies in this group.

*0.93 sample noted to be in black slate a common phenomenon of Keewatin rocks which are known to host high silver cobalt and arsenide veins.

Area #3 - "North Cobalt" (22 Supplies Sampled)

- 5 shallow wells that is, wells from 0' to 30' in depth
Arsenic range 0.001 mg/l to 0.004 mg/l
- 1 deep well
30' to 200'
Arsenic at 0.001 mg/l
- All wells noted are within a one mile radius of one another.

Area #4 - "Greater Haileybury" (14 Supplies Sampled)

- 3 shallow wells
0' to 30' in depth
Arsenic range of 0.001 mg/l to 0.002 mg/l
- 2 deep wells
30' to 200'
Arsenic range from 0.002 mg/l to 0.004 mg/l
- 1 supply of unknown origin
- All wells noted above range within a one mile radius of one another.

Area #5 - "Firstbrook - Bucke Area" (17 Supplies Sampled)

- 1 shallow well
0' to 30' in depth
Arsenic level 0.001 mg/l
- 2 surface water
Arsenic levels 0.001 mg/l
- 2 deep wells
30' to 200' in depth
Arsenic levels 0.002 mg/l
- 1 spring
Arsenic level of 0.001 mg/l
- All Supplies noted with two mile radius of each other.

Area #6 - "New Liskeard Radley Area" (4 Supplies Sampled)

- 2 deep wells
200'
Arsenic level of 0.001 mg/l
- Wells are within 100 yards of each other.

Area #7 - "Casey Hill Area" (6 Supplies Sampled)

- 2 shallow wells ranging from 0' to 30' in depth
Arsenic values range from 0.020 mg/l to 0.037 mg/l
- Both wells are approximately one mile from one another.

Area #8 - "Hudson Township" (52 Supplies Sampled)

- 3 shallow wells
0' to 30' in depth
Arsenic range 0.001 to 0.004 mg/l
- 18 deep wells
30' to 200' in depth
Arsenic range 0.001 to 0.004 mg/l
- 2 springs
Arsenic range of 0.001

INTERPRETATION

I Is There Evidence of Natural or Man-made Contamination of Water Supplies?

1) Municipal

Based on the results of five sets of comprehensive samples taken from the five municipal water works since 1972, there is no evidence of any metal or arsenic contamination of these supplies. Although these systems appear safe, a comprehensive two year monitoring programme should be undertaken to provide conclusive proof that there are no short-term periods of elevated constituent levels.

At this time the operating authorities for the supplies with surface water sources (Latchford, Cobalt and Haileybury) have started to submit monthly samples of their supplies for metals and arsenic determinations.

2) Communal Supplies

A. Old Cobalt Refinery Townsite

The first sample indicated that this water supply contained arsenic in the amount of 0.037 mg/l. Three subsequent samples have indicated similar levels. The refinery has been known for quite some time to have produced problems from the disposal of arsenic-rich waste products and the emission of arsenic from its refining process.

The open tailings areas and unmarketable residues remaining in the confines of the property may be contaminating the ground water used as the source for the refinery water works which now feeds the housing development.

In the spring of 1977 the property of the refinery will be surveyed by the Ministry to determine the cause of the elevated arsenic levels in the water supply.

Meetings have taken place in the months of January, February and March with Mr. J. Cram of Kam Kotia Mines Ltd. (owners of the property) to discuss alternatives for water supply in the event levels of arsenic go beyond the Ministry's rejection level.

B. Giroux Lake Well

Arsenic levels of 0.76 mg/l in the sample of December 8, 1975 proved conclusively that this water supply far exceeded the Ministry of the Environment rejection limit and could be considered a health hazard.

This hand pumped well, is situated in an area with little overburden and a great amount of bedrock in the midst of the original Cobalt Mining Camp. It was considered one of the original wells of the area and served as drinking water for immediate residents and cottagers. It was used intensively enough that a small building was constructed around the pump to keep the elements away from the users.

It is impossible at this time to pinpoint the reasons of this contamination. The geochemical relationship with the native minerals known for their abundance in arsenides, and the fact that the roadway and parking areas close to the well are probably constructed of waste mine rock, may both be factors to the presence of arsenic in this well.

C. Bucke Township Park Supply

In August of 1976, a water sample from the Bucke Township Park well proved to have levels of arsenic in amounts of 4.4 mg/l. This supply for the park, served all the campsites, the park's canteen, and various residents neighbouring the park.

The flowing well was the result of a diamond drill hole into intensive mineralized rock formations known for high quantities of nickel and cobalt. The flowing drill hole was eventually converted into a source of drinking water for the park.

Aguanico Mine operated the now abandoned mine on the park's boundary. Mine tailings and waste rock stained with erythrite and annabergite, (the secondary minerals formed by oxidation of cobalt and nickel arsenides) are evident around the abandoned headframe. Arsenic and metals from these sources have been seen leaching into Lake Timiskaming within yards of the former drinking water supply of the park. It is not known if the diamond drill hole did tap the minerals in the ore body or if it is receiving the arsenic contamination as a result of the tailings and waste rock around the headframe.

D. Mileage 104 Well

Although the sample results did not demonstrate any problem with elevated arsenic or metal levels, the supply should be monitored to ensure that Farr Creek is not influencing the water quality.

E. Water Supplies at Hotel, Motel and Private Campsites

A total of nine (9) private establishments in the Tri-Town area have had an original water sample taken and tested

for arsenic. No samples have contained amounts of arsenic above 0.004 mg/l.

3) Private

Based on the analysis results of the one hundred and eighty-eight (188) supplies tested in November of 1976, there is evidence of contamination of private supplies in the Tri-Town area. These analysis results and subsequent re-samplings have demonstrated that twelve (12) supplies have constituent levels above Ministry objectives.

Forty-seven (47) supplies had levels of arsenic and eleven (11) supplies had levels of metals which were measurable but within the Ministry of the Environment objectives.

While 93.6% of the supplies had water with arsenic and metal levels at safe ranges in November, it is not possible to predict whether the constituent levels detectable in 36.7% of the supplies will increase on a seasonal basis.

II Would There Be Variations in Water Quality of the Supplies In the Area?

1) Temperature

Seasonal variations in atmospheric surface and ground water temperatures may be one factor which will create variations in the levels of elements and compounds found in the water supplies of this area. All chemical reactions are temperature dependent. The solubility in water of most components increases with increasing temperature.

No measurements of the temperature of the supplies at the time of sampling have been made. Although subsurface water temperatures show relatively little variation on a seasonal basis, surface water temperatures will range between 0° C and 30° C.

Of course the atmospheric temperature is of major importance in determining the nature and rate of spring ground water recharge in small aquifers.

The total result of these temperature variations on Water Quality is unknown on the basis of the present study data.

2) Water Composition

The aggressivity of water is dependent upon parameters which vary as the water moves through the hydrogeologic cycle. Water hardness, alkalinity, the presence of dissolved oxygen, ph and temperature are factors with known influence on ground water's tendency to pick up metals and arsenic from sources in the overburden and bedrock.

Staff involved in the survey to date have not had the data or expertise to begin to calculate the rates at which arsenic and metals will be leached from known deposits in the overburden and bedrock. The survey results to date do not provide a basis from which to determine if there are variations in the water quality as a result of changes in the composition of the water moving into and through the acquifer.

III Is There A Greater Risk of Detectable Arsenic or Metal Levels for Specific Types or Depths of Water Supplies In the Tri-Town Area?

Drinking water from all types of supplies throughout the

survey area displayed elevated levels of arsenic. There seemed to be no common base to establish reasons for these elevated supplies.

Instances throughout the survey area indicated that samples from neighbouring supplies, each drawing water from different types of wells at various depths, both contained detectable arsenic levels.

It would be erroneous to believe that a specific kind of well would produce water with arsenic or metals below detectable levels.

IV Are There Areas Where Private Water Supplies Have A Significant Probability of Containing Detectable Arsenic Or Metal Levels?

In the November survey of one hundred and eighty-eight wells (188) fifty-eight (58) wells with detectable levels of arsenic (noted on map #3) appeared throughout the entire survey area.

These levels appeared not only adjacent to known mining activity, but also in agriculture communities and residential developments. Areas that had originally been planned to be used as control sample areas also proved to have arsenic levels at detectable levels.

Based upon the water analysis and the actual locations of the sample points there is a significant probability that detectable arsenic levels will be found in private water supplies throughout the Tri-Town area.

CONCLUSIONS

- 1) The five municipal water supplies are providing safe water to consumers (based on analysis results to date).
- 2) Private water supplies in at least eight (8) areas of the Tri-Town (defined in the report) contain metals and/or arsenic at detectable levels. Twelve (12) private supplies had arsenic or zinc components at or above the Ministry's objectives. Five of these supplies had arsenic levels in excess of the Ministry's rejection limit. There is proof of the same contamination of private water supplies in this area.
- 3) More work is required to determine if there are seasonal increases of metal or arsenic contamination of private water supplies in the Tri-Town area. Until there are sample data confirming that the November 1976 results are representative of annual levels, there is no assurance that the 176 supplies which were safe in November are safe throughout the year.
- 4) Private water supplies in the survey area which were not sampled to date should be to confirm that there are no harmful components in the water. In view of the fact that such systems have not been sampled yet, in spite of several inspector visits, any attempt to complete the survey should be conducted in the evenings or on weekends when there is a greater chance of finding working residents home.
- 5) At this time it is not possible to determine the extent to which man's activities and/or the natural geologic formation of the area have affected the private water supplies of the Tri-Town. Present data demonstrate that some supplies are probably being contaminated by natural phenomena while others may have been influenced by mining or construction

activity in the area.

To predict future metal and arsenic levels of water supplies throughout the Tri-Town it will be necessary to know about the nature and composition of the top soil, overburden and bedrocks of specific areas. It will be necessary to have groundwater movements mapped.

When these facts are known, it might be possible to define areas where further residential development should be discouraged because of the possibility of a health hazard associated with the probable water supply.

RECOMMENDATIONS

It is recommended:

1. That a Municipal water sampling program of the five communal water systems in the Tri-Town area commence immediately, with monthly samples submitted for analysis. A reasonable period of time for this program would be two years.
2. That all private water supplies in the designated areas not sampled to date be sampled. This should include all seasonal homes and cottages.
3. That a representative number of supplies be intensively monitored to determine the magnitude of any variations in water quality.
4. That technical experts within the Provincial Government begin to take inventory of topsoil, overburden and bedrock in the Tri-Town area, to determine the sources of these metals including arsenic in the private water supplies throughout the area.
5. That a public meeting be held to explain results of sampling and to provide residents with expert opinions on the chemical constitution of their water supply.

Prepared by


W.M. Marshall,
Environmental Officer

APPENDIX I

MISCELLANEOUS ANALYSIS RESULTS

- 1) December 8, 1975
- 2) Cobalt Municipal Supply
- 3) Haileybury Water Supply
- 4) New Liskeard Water Supply
- 5) Latchford Water Supply
- 6) Dymond Twp. Water Supply
- 7) August 11, 1976

APPENDIX #1December 8, 1975 Water Sample Results

<u>No.</u>	<u>Name</u>	<u>Source</u>	<u>Arsenic</u> mg/l	<u>Mercury</u> mg/l
1.	Giroux Lake Well	Shallow Well	0.076	<0.0004*
2.	Mileage 104 Well	Shallow Well	0.004	<0.0004*
3.	Paulette McLaren North Cobalt	Shallow Well	0.001	<0.0004*
4.	O. Quehe North Cobalt	Shallow Well	0.001	<0.0004*
5.	Paul Bouchard	Shallow Well	0.004	<0.0004*
6.	Robert Burrows	Shallow Well	<0.001	<0.0004*

Water Sample Results from Cobalt Municipal Supply

<u>Date of Sample</u>	<u>Arsenic Level</u> mg/l	<u>Mercury Level</u> mg/l	<u>Sample Type</u>
Sept. 29 1976	0.002		raw
	0.003		treated
Feb. 25 1976	0.004		
Jan. 25 1977	0.003	Hg .0016*	
Dec. 13 1976	0.004		
Dec. 6 1976	0.004		
Nov. 30 1976	0.004		raw
	0.003		treated
Oct. 5 1976	0.004		raw
May 28 1976	0.003		treated

Water Sample Results from Haileybury Water Supply

<u>Date of Sample</u>	<u>Arsenic Level</u> mg/l	<u>Mercury Level</u> mg/l
Sept. 29 1976	<0.001	<0.02*
Feb. 2 1977	0.001	
Oct. 1 1976	0.002	

* - microgram/litre

Water Sample Results from New Liskeard Water Supply

<u>Date</u>	<u>Arsenic Level</u> mg/l
Feb. 25 1976	<0.001

Water Sample Results from Latchford Water Supply

<u>Date</u>	<u>Arsenic Level</u> mg/l	<u>Mercury Level</u> mg/l
Sept. 29 1976	0.0002	<0.02*
Feb. 25 1976	0.0002	
June 29 1976	<0.001	

Water Sample Results from Dymond Twp. Water Supply

<u>Date</u>	<u>Arsenic Level</u> mg/l
Feb. 25 1976	0.003

Water Sample Results from Aug. 11, 1976

<u>No.</u>	<u>Type of Sample</u>	<u>Description of Supply</u>	<u>Arsenic Level</u> mg/l
1.	Dug Well	¼ mi. North of Martineau Bay, North Cobalt	0.001
2.	Drilled Well	Mr. Barry, Hwy 567 North Cobalt	<0.001
3.	Spring Water	Hero Residence, Hwy 567 North Cobalt	<0.001
4.	Dug Well	Old Mission Resort, Hwy 567 North Cobalt	<0.001
5.	Spring Water	Bucke Twp. Park, Hwy 567 North Cobalt	4.4

* - microgram/litre

Water Sample Results from Aug. 12 Survey 1976

<u>No.</u>	<u>Owner</u>	<u>Location</u>	<u>Arsenic Level</u> mg/l	<u>Mercury Level</u> mg/l
1.	Mr. O. Moore	R.R. #1 Cobalt	0.004	<0.0002*
2.	Mrs. L. Montgomery	Box 44 Cobalt	0.003	<0.0002*
3.	Mr. R. Stewart	Box 337 Cobalt	0.003	<0.0005*
4.	Mr. R. Follick	Box 231 Cobalt	0.004	<0.0002*
5.	Mr. H. Morin	Conagas Rd. Cobalt	0.004	<0.0002*
6.	Mrs. M. Holstead	43 Cobalt St. Cobalt	0.003	<0.002*
7.	Mr. E. Geck	Cobalt	0.003	<0.0002*
8.	Mr. B. Verdum		0.017	<0.0002*
9.	Loon Lake Trailer Park	Box 1533 N.L.	0.001	<0.0002*
10.	Gillies Lake Cabins	R.R. #1 Cobalt	0.004	<0.0002*
11.	Blue Top Motel	North Cobalt	0.001	<0.0002*
12.	Johnstons Houskeeping Cabins		<0.001	<0.0002*
13.	Edge Water Motel	R.R. #1 Haileybury	0.003	<0.0002*
14.	Glen Aura Cottages	Box 373 New Liskeard	0.001	<0.0002*
15.	Sunny Vale Cottages	R.R. #3 N.L.	<0.001	<0.0002*
16.	Camp BoGuay	R.R. #3 N.L.	<0.001	0.0002*
17.	Mr. J. Ward	Box 802 Haileybury	0.022	<0.0002*
18.	Mrs. M. Brisson	North Cobalt	<0.001	0.002*
19.	Mr. J. Cranston	North Cobalt	<0.001	<0.0002*
20.	Mrs. R. Page	North Cobalt	0.003	<0.0002*

* - microgram/litre

APPENDIX II

ANALYSIS RESULTS FROM NOVEMBER SURVEY

(Results from 188 Private Supplies)

SAMPLE RESULTS FROM NOVEMBER WELL SURVEY

NOTE:

1. *Results are grouped by Township.
2. *Sample number refers to the actual identification code used on the sample submission sheets.
3. These components are reported:

As	-	Arsenic
Co	-	Cobalt
Pb	-	Lead
Zn	-	Zinc
Cd	-	Cadmium
Ni	-	Nickel
Ag	-	Mercury
4. All results are in parts per million (ppm) except for the mercury results which are in parts per billion (ppb).

Details on the Type of Water Supply and the depth of the well (if appropriate) are presented as the last two entries on the following pages. The legend used to describe the Water Supplies is as follows:

- | | |
|--|---|
| 1 - well condemned
2 - no well
3 - spring well
4 - Cobalt water system
5 - dug well
5a - dug point well
6 - drilled well
7 - pond | 8 - diamond drill hole
9 - creek water
10 - lake water
11 - surface water
12 - sand-point well
13 - well flowing
* - well unknown |
|--|---|

BUCKE	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D	
Mrs. E. Smith, Box 403, Cobalt	L6	<.001	< 0.01	< 0.01	0.21	< 0.005	< 0.01	<.02	5	12
Mr. Fred Larkin, Box 595, Cobalt	L7	<.001	< 0.01	< 0.01	0.21	< 0.005	< 0.01	<.02	3	10
Messrs. Wm. Oullette, E. Taylor, D. Brian, Box 342, Cobalt	L8	<.001	< 0.01	< 0.01	0.11	< 0.005	< 0.01	<.02	5	12
Mr. Joel Boucher, Cobalt	L9	.002	< 0.01	< 0.01	0.18	< 0.005	< 0.01	<.02	5	12
Mr. U. Larabie, Box 188, Cobalt	L10	<.001	< 0.01	< 0.01	0.34	< 0.005	< 0.01	<.02	3	8
Mr. G. Frandsem, Box 275, Cobalt	L11	<.001	< 0.01	< 0.01	1.2	< 0.005	< 0.01	<.02	5	25
Mr. Wm. Sylvester, Bloom St., North Cobalt	L12	<.001	< 0.01	< 0.01	0.12	< 0.005	< 0.01	<.02	5	21
Mrs. Clayton Wilson, Box 106, North Cobalt	L13	<.001	< 0.01	< 0.01	0.21	< 0.005	< 0.01	<.02	5	
Mr. Donald Evans, Box 122, North Cobalt	L14	<.001	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	<.02	5	6
Mr. Gordon Evans, Box 144, North Cobalt	L15	.004	< 0.01	< 0.01	0.10	< 0.005	< 0.01	<.02	5	2
Mr. Mervin Neill, Box 197, North Cobalt	L16	.001	< 0.01	< 0.01	1.6	< 0.005	< 0.01	<.02	5	25
Mr. M.J. Dwyer, Box 85, North Cobalt	L17	<.001	< 0.01	< 0.01	0.52	< 0.005	< 0.01	<.02	5	10
Mr. Stanley Willard, Box 156, North Cobalt	L18	<.001	< 0.01	< 0.01	0.15	< 0.005	< 0.01	<.02	5	22
Mr. Archie Baumaour, Box 993, Haileybury	L19	<.001	< 0.01	0.01	0.24	< 0.005	< 0.01	<.02	5	24
Ms. Eileen Johnson, Box 444, Haileybury	L20	<.001	< 0.01	0.02	0.59	< 0.005	< 0.01	<.02	5	25
Mr. E. Letellier, Box 132, Haileybury	L21	<.001	< 0.01	0.02	0.13	< 0.005	< 0.01	<.02	6	60
Mr. G. Samson, Box 1346, Haileybury	L22	<.001	< 0.01	< 0.01	0.11	< 0.005	< 0.01	<.02	3	2
Mr. Pat Hawkins, #1, Haileybury (R.R. #1)	L23	.002	< 0.01	< 0.01	0.38	< 0.005	< 0.01	<.02	5	
Mr. Norman Cleroux, Edward St., Haileybury	L24	<.001	< 0.01	< 0.01	2.2	< 0.005	< 0.01	<.02	5	15
Mr. James Farrow, Box 1154, Haileybury	L25	.001	< 0.01	< 0.01	0.40	< 0.005	< 0.01	<.02	5	12
Mr. W. Polenz, #1, Haileybury (R.R. #1)	L26	.002	< 0.01	< 0.01	0.09	< 0.005	0.01	<.02	6	134
Mr. Klaas Bosch, Box 852, Haileybury	L27	<.001	< 0.01	0.01	2.5	< 0.005	< 0.01	<.02	5	24
Ms. Christine Sroka, West Rd., Haileybury	L28	<.001	< 0.01	< 0.01	0.80	< 0.005	< 0.01	<.02	6	
Mr. W. Zemek, Box 577, Haileybury	L29	<.001	< 0.01	< 0.01	0.07	< 0.005	< 0.01	<.02	6	60
Mr. W. Buckland, Box 341, Haileybury	L30	<.001	< 0.01	0.02	0.14	< 0.005	< 0.01	<.02	6	80
Mr. Bill Cousins, #1, Haileybury (R.R. #1)	L31	.001	< 0.01	< 0.01	0.72	< 0.005	0.02	<.02	6	200
Mr. E. Sauve, #1, Haileybury (R.R. #1)	L32	<.001	< 0.01	< 0.01	0.46	< 0.005	< 0.01	<.02	6	197

BUCKE	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. D. Horne, #1, Haileybury (R.R. #1)	L33	< .001	< 0.01	< 0.01	2.0	< 0.005	< 0.01	< .02	6 175
Mr. A. Porter, #1, Haileybury (R.R. #1)	L34	< .001	< 0.01	< 0.01	0.40	< 0.005	< 0.01	< .02	6 35
Mr. H. Hopkins, #1, Haileybury (R.R. #1)	L35	< .001	< 0.01	< 0.01	0.10	< 0.005	< 0.01	< .02	5 15
Three H Manufacturing, New Liskeard	L36	< .001	< 0.01	< 0.01	0.01	< 0.005	< 0.01	< .02	6 213
New Ontario Dynamics, Box 1179, New Liskeard	L37	< .001	< 0.01	< 0.01	0.05	< 0.005	< 0.01	< .02	6 220
New Ontario Dynamics, Box 1179, New Liskeard	L38	.001	< 0.01	< 0.01	0.02	< 0.005	0.01	< .02	6 212
New Ontario Dynamics	L39	.001	< 0.01	0.02	1.3	< 0.005	< 0.01	< .02	6 220
Mr. L. Fleming, #1, Haileybury (R.R. #1)	L40	< .001	< 0.01	< 0.01	0.30	< 0.005	< 0.01	< .02	5
Mr. B. Middleton, #1, Haileybury (R.R. #1)	L41	< .001	< 0.01	< 0.01	0.02	< 0.005	< 0.01	< .02	5 16
Mr. P.H. Beneke, Gen. Delivery, New Liskeard	L42	< .001	< 0.01	< 0.01	0.16	< 0.005	0.01	< .02	5 19
Mr. P.H. Beneke, Gen. Delivery, New Liskeard	L43	.001	< 0.01	< 0.01	0.38	< 0.005	< 0.01	< .02	5 14
Mr. K. Schaefer, Box 246, Haileybury	L44	< .001	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< .02	6 150
Mr. A. Seed, Box 337, Haileybury	L45	< .001	< 0.01	< 0.01	0.38	< 0.005	< 0.01	< .02	5 18
Mr. E. Caron, Box 31, New Liskeard	L46	< .001	< 0.01	< 0.01	0.06	0.01	< 0.01	< .02	6 127
Mr. Jim Hopkins, Box 897, Haileybury	L47	< .001	< 0.01	< 0.01	0.10	< 0.005	< 0.01	< .02	5 26
Mr. R. Skinner, General Delivery, New Liskeard	L48	< .001	< 0.01	< 0.01	1.5	< 0.005	< 0.01	< .02	6 60
M.T.C., Haileybury	L49	< .001	< 0.01	< 0.01	0.09	< 0.005	< 0.01	< .02	6 255
Mr. B. Lorenz, #1, Haileybury (R.R. #1)	L50	< .001	< 0.01	< 0.01	1.2	< 0.005	< 0.01	< .02	5 30
Mr. R. Gauvreau, #1, New Liskeard (R.R. #1)	L51	< .001	< 0.01	< 0.01	0.11	< 0.005	0.01	< .02	5 21
Mr. H. Johnson, #1, Haileybury (R.R. #1)	L52	< .001	< 0.01	< 0.01	0.02	< 0.005	0.01	< .02	6 60
Pentecostal Assembly, Box 453, Haileybury	L53	< .001	< 0.01	< 0.01	0.46	< 0.005	< 0.01	< .02	6 60-70
Mr. H. Sadler, #1, Haileybury (R.R. #1)	L54	< .001	< 0.01	< 0.01	0.26	< 0.005	< 0.01	< .02	6 92
Mr. M. Campbell, #1, Haileybury (R.R. #1)	L55	< .001	< 0.01	< 0.01	0.92	< 0.005	< 0.01	< .02	6 100
Mr. G. Cranston, Lakeview Ave., North Cobalt	L56	< .001	< 0.01	< 0.01	0.19	< 0.005	< 0.01	< .02	5 20
Mr. A. Fillion, Box 61, North Cobalt	L57	< .011	< 0.01	< 0.01	2.4	< 0.005	< 0.01	< .02	5 33
Mr. V. Tesker, Box 137, North Cobalt	L58	.001	< 0.01	< 0.01	0.20	< 0.005	< 0.01	< .02	5
Mr. N. Hermiston, Box 102, North Cobalt	L59	.002	< 0.01	< 0.01	0.24	< 0.005	< 0.01	< .02	5 20

BUCKE	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. J. Hacquard, Box 163, North Cobalt	L60	.023	< 0.01	< 0.01	0.06	< 0.005	< 0.01	< .02	5
Mr. Frank Hacquard, Box 2039, North Cobalt	L61	< .001	< 0.01	< 0.01	0.02	< 0.005	0.01	< .02	5 12
Mr. L. Millard, Box 148, North Cobalt	L63	< .001	< 0.01	0.04	7.1	< 0.005	< 0.01	< .02	5
Mr. Barry Ward, Box 1312, Haileybury	N53	< .001	< 0.01	< 0.01	0.10	< 0.005	< 0.01	< .02	5
Mr. Jim Glassford, Box 83, North Cobalt	N54	.010	< 0.01	< 0.01	0.17	< 0.005	< 0.01	< .02	5
Mr. J. Burrows, R.R. #1, Haileybury	F11	< .001	< 0.01	< 0.01	0.67	< 0.005	< 0.01	< .02	5 27
Mr. R. Haddow, R.R. #1, Haileybury	F3	.002	< 0.01	< 0.01	1.4	< 0.005	< 0.01	< .02	6 400
Mr. J. Gilmour, R.R. #1, Haileybury	F2	< .001	< 0.01	< 0.01	0.07	< 0.005	< 0.01	< .02	5 14
Mr. W. Howard R.R. #1, Haileybury	F1	< .001	< 0.01	< 0.01	0.69	< 0.005	< 0.01	< .02	5 30
<u>CASEY</u>									
Mr. F. LaFerriere, #3, New Liskeard (R.R. #3)	F54	< .001	< 0.01	< 0.01	0.46	< 0.005	< 0.01	< .02	6 82
Mr. C. Presseault, #3, New Liskeard (R.R. #3)	F55	< .001	< 0.01	< 0.01		< 0.005	< 0.01	< .02	6 62
Mr. L. LeRheult, #3, New Liskeard (R.R. #3)	F56	< .001	< 0.01	< 0.01		< 0.005	< 0.01	< .02	6 75
Mr. G. DeBernardi, #3, New Liskeard (R.R. #3)	F57	< .001	< 0.01	< 0.01		< 0.005	< 0.01	< .02	6
Mr. R. DeBernardi, #3, New Liskeard (R.R. #3)	F58	.002	< .01	< 0.01	< 0.01	< 0.005	< 0.01	< .02	6 80
<u>COLEMAN</u>									
Mr. R. Mercier, General Delivery, Cobalt	F12	.001	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< .02	3
Mr. R. Dufresne, R.R. #1, Cobalt	F13	< .001	< 0.01	< 0.01	0.25	< 0.005	< 0.01	< .02	5 20
Mr. L. Steele, R.R. #1, Cobalt	F14	< .001	< 0.01	0.01	2.9	< 0.005	< 0.01	< .02	5a 42
Mr. D. Dufresne, R.R. #1, Cobalt	F15	< .001	< 0.01	< 0.01	0.05	< 0.005	< 0.01	< .02	5a 35
Mr. A. Caron, R.R. #1, Cobalt	F17	.001	< 0.01	0.02	0.07	< 0.005	< 0.01	< .02	5a 27
Mrs. J. Avery, R.R. #1, Cobalt	F19	< .001	< 0.01	< 0.01	3.5	< 0.005	< 0.01	< .02	5a 40
Mr. R. Shoup, R.R. #1, Cobalt	F20	< .001	< 0.01	< 0.01	0.15	< 0.005	< 0.01	< .02	5 25
Highway Bookshop, R.R. #1, Cobalt	F21	< .001	< 0.01	< 0.01	0.11	< 0.005	< 0.01	< .02	5 20
Mr. E. Cook, R.R. #1, Cobalt	F22	< .001	< 0.01	< 0.01	0.09	< 0.005	< 0.01	< .02	5 12

COLEMAN	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. S. Cook, R.R. #1, Cobalt	F23	<.001	< 0.01	<0.01	0.27	<0.005	<0.01	<.02	5 12
Mr. R. Rudder, R.R. #1, Cobalt	F24	<.001	0.01	0.01	1.3	< 0.005	<0.01	<.02	*
Mr. S. Lopley, R.R. #1, Cobalt	F25	0.037	< 0.01	0.01	0.16	<0.005	<0.01	<.02	11
Mr. J. O'Brian, R.R. #1, Cobalt	F26	<.001	<0.01	<0.01	0.19	<0.005	0.02	<.02	5a 35
Mr. McIntyre, R.R. #1, Cobalt	F27	<.001	<0.01	<0.01	0.36	< 0.005	<0.01	<.02	5a 26
Mr. D. Geroux, R.R. #1, Cobalt	F28	<.001	< 0.01	< 0.01	0.05	< 0.005	<0.01	<.02	*
Mr. R. Garreu, #1, Cobalt (R.R. #1)	F29	<.001	<0.01	<0.01	2.1	< 0.005	<0.01	<.02	* 26
Mr. B. Kanty, #1, Cobalt (R.R. #1)	F30	<.001	< 0.01	< 0.01	7.0	<0.005	<0.01	<.02	12 40
Mr. T. Dwer, #1, Cobalt (R.R. #1)	F31	.001	< 0.01	<0.01	0.37	< 0.005	0.01	<.02	12 20
Mr. L. Hamilton, #1, Cobalt (R.R. #1)	F32	.002	< 0.01	<0.01	0.04	< 0.005	<0.01	<.02	10
Mr. A. Carriere, #1, Cobalt (R.R. #1)	F33	.001	0.01	0.02	0.26	< 0.005	<0.01	<.02	12 30
Mr. R. Jones, #1, Cobalt (R.R. #1)	F34	<.001	0.02	< 0.01	0.04	< 0.005	<0.01	<.02	12 20
Mr. T. Hakola, #1, Cobalt (R.R. #1)	F35	<.001	< 0.01	< 0.01	0.39	< 0.005	<0.01	<.02	12 15
Mr. D. Hakola, #1, Cobalt (R.R. #1)	F36	<.001	< 0.01	0.01	0.16	< 0.005	< 0.01	<.02	12 12
Mr. D. Sirola, #1, Cobalt (R.R. #1)	F37	<.001	< 0.01	< 0.01	0.11	< 0.005	< 0.01	<.02	12 15
Mr. A. Adshead, #1, Cobalt (R.R. #1)	F38	<.001	< 0.01	< 0.01	0.06	< 0.005	< 0.01	<.02	12 25
Mr. M. Carriere, #1, Cobalt (R.R. #1)	F39	<.001	< 0.01	< 0.01	0.06	< 0.005	< 0.01	<.02	12 20
Mr. E. Thurlow, #1, Cobalt (R.R. #1)	F40	<.001	< 0.01	< 0.01	0.12	< 0.005	< 0.01	<.02	12 25
Mr. H. Cote, #1, Cobalt (R.R. #1)	F41	<.001	< 0.01	< 0.01	0.12	< 0.005	< 0.01	<.02	12 20
Mr. V. Vigelow, #1, Cobalt (R.R. #1)	F42	<.002	< 0.01	< 0.01	0.46	< 0.005	0.01	<.02	6 120
Ms. V. Nichols, #1, Cobalt (R.R. #1)	F43	<.001	< 0.01	< 0.01	0.02	< 0.005	< 0.01	<.02	5 12
Mr. D. Stewart, #1, Cobalt (R.R. #1)	F44	0.93	< 0.01	< 0.01	0.14	< 0.005	< 0.01	<.02	6
Ms. E. Bigelow, #1, Cobalt (R.R. #1)	F45	<.001	0.01	< 0.01	0.35	< 0.005	< 0.01	<.02	6 60
Mrs. E. Montgomery, #1, Cobalt (R.R. #1)	F46	.001	< 0.01	< 0.01	0.40	< 0.005	< 0.01	<.02	6 68
Mr. D. Berton, R.R. #1, Cobalt	F16	<.001	< 0.01	< 0.01	0.20	< 0.005	< 0.01	<.02	5 10
Mr. R. McNickle, R.R. #1, Cobalt	F18	.002	< 0.01	< 0.01	0.27	< 0.005	< 0.01	<.02	6 170
Mr. L. Heikkila, Box 852, Cobalt	A	TOWN WATER							1

COLEMAN	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. F.G. Chitty, Box 47, Cobalt	B	TOWN WATER							1
Mr. Gilbert Coe, Box 433, Cobalt	C	TOWN WATER							1
Mr. Charles Reece, Box 121, Cobalt	D	TOWN WATER							2
Mr. William Pascoe, Jr., Box 62, Cobalt	L2	.002	< 0.01	< 0.02	0.01	< 0.005	< 0.01	< .02	3
Mr. J.H. Price, Box 274, Cobalt	L3	.002	< 0.01	< 0.01	0.27	< 0.005	< 0.01	< .02	4
Coleman Twp. Office, Box 472, Cobalt	L4	< .001	0.01	0.02	3.2	< 0.005	< 0.01	< .02	5 12
Mr. Michael Leishman, Box 267, Cobalt	L5	< .008	< 0.01	< .01	2.5	< 0.005	< .01	< .02	3 5
<u>DYMOND</u>									
Mr. W. Magens, #2, New Liskeard (R.R. #2)	F60	< .001	< 0.01	< 0.01	0.11	< 0.005	< 0.01	< .02	6
Mr. R. LeGroux, #2, New Liskeard (R.R. #2)	F61	.001	< 0.01	< 0.01	0.65	< 0.005	< 0.01	< .02	6 100
Mr. E. Peddie, #3, New Liskeard (R.R. #3)	F62	< .001	< 0.01	< 0.01	0.49	< 0.005	< 0.01	< .02	5 12
Mr. Robert Miclette, R.R. #1, New Liskeard	N45	< .001	< 0.01	< 0.01	0.10	< 0.005	< 0.01	< .02	7
Mr. Gordon Campsall, Box 622, New Liskeard	N47	< .001	< 0.01	< 0.01	0.39	< 0.005	0.05	< .02	6 16
<u>FIRSTBROOK</u>									
Mr. A. Caron, R.R. #1, Haileybury	F4	.006	< 0.01	0.01	0.04	< 0.005	< 0.01	< .02	8
Mr. S. Wright, R.R. #1 Haileybury	F5	.001	< 0.01	< 0.01	0.06	< 0.005	< 0.01	< .02	9
Mr. W. Clinker, R.R. #1, Haileybury	F6	.001	< 0.01	< 0.01	0.08	< 0.005	< 0.01	< .02	9
Mr. O. LaFleur, R.R. #1, Haileybury	F7	.002	< 0.01	< 0.01	1.5	< 0.005	< 0.01	< .02	6 52
Mr. W. St. Onge, Box 939, Haileybury	F8	< .001	< 0.01	< 0.01	0.78	< 0.005	< 0.01	< .02	6
Trans Can. Pipeline, Box 939, Haileybury	F9	< .001	< 0.01	< 0.01	0.03	< 0.005	< 0.01	< .02	6 30
Mr. B. Jenkins, Box 348, Cobalt	F10	.001	< 0.01	< 0.01	< 0.01	< 0.005	< 0.01	< .02	5 21
<u>GILLIES LIMIT</u>									
Mrs. Jessie Tasse, Geroux Lake, Cobalt	L1	.068	< .01	< 0.01	0.02	< 0.005	< .01	< .02	10

HARRIS	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. Don Wood, #3, New Liskeard (R.R. #3)	F47	<.001	<0.01	<0.01	0.34	<0.005	<0.01	<.02	5
Mr. R. Denis, #3, New Liskeard (R.R. #3)	F48	<.001	<0.01	<0.01	1.1	<0.005	<0.01	<.02	5 16
Mr. J. Waugh, #3, New Liskeard (R.R. #3)	F49	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	5 23
Mr. D. Waugh, #3, New Liskeard (R.R. #3)	F50	.037	<0.01	<0.01	0.86	<0.005	<0.01	<.02	5 20
Mr. M. Nurmi, #3, New Liskeard (R.R. #3)	F51	<.001	<0.01	0.02	0.09	<0.005	<0.01	<.02	5
Mr. A. Laferriere, #3, New Liskeard (R.R. #3)	F52	<.001	<0.01	<0.01	0.01	<0.005	<0.01	<.02	6 150
Mr. L. Roch, #3, New Liskeard (R.R. #3)	F59	<.001	<0.01	<0.01	0.01	<0.005	<0.01	<.02	5 12
Mr. L. Laferriere, #3, New Liskeard (R.R. #3)	F53	0.020	<0.01	<0.01	0.23	<0.005	<0.01	<.02	5 15
<u>HUDSON</u>									
Mr. Richard Jibb #1, New Liskeard (R.R. #1)	N1	<.001	<0.01	<0.01	0.10	<0.005	<0.01	<.02	3
Messrs. Jack & Wayne Carl, #1, New Liskeard (R.R. #1)	N2	.001	<0.01	<0.01	0.21	<0.005	<0.01	<.02	6 90
Mr. Don Messenger, #1, New Liskeard (R.R. #1)	N3	<.001	<0.01	<0.01	0.05	<0.005	<0.01	<.02	5
Mr. Ralph Peters, #1, New Liskeard (R.R. #1)	N4	<.001	<0.01	<0.01	0.28	<0.005	0.01	<.02	5
Mr. Oscar Villneff, R.R. #1, New Liskeard	N5	<.001	<0.01	<0.01	0.13	<0.005	<0.01	<.02	5 30
Mr. E. Morrow, R.R. #1, New Liskeard	N6	.002	<0.01	<0.01	0.07	<0.005	<0.01	<.02	3
Mr. Paul Beland, R.R. #1, New Liskeard	N7	.006	<0.01	<0.01	0.05	<0.005	<0.01	<.02	6 60
Mr. Virgil Foley, R.R. #1, New Liskeard	N8	.004	<0.01	<0.01	0.02	<0.005	<0.01	<.02	6 80
Mr. Jack Ridley, R.R. #1, New Liskeard	N9	<.001	<0.01	<0.01	0.03	<0.005	<0.01	<.02	5 22
Mr. Fred Foley, R.R. #1, New Liskeard	N10	<.001	<0.01	<0.01	0.23	<0.005	<0.01	<.02	5
Mr. George Quehe, R.R. #1, New Liskeard	N11	.001	<0.01	<0.01	0.21	<0.005	<0.01	<.02	6 200
Mr. John M. Bumstead, R.R. #1, New Liskeard	N12	.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	6 110
Mr. Ray Sturgeon, R.R. #1, New Liskeard	N13	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	5
Mr. Don Fowler, R.R. #1, New Liskeard	N14	.001	<0.01	<0.01	0.13	<0.005	<0.01	<.02	5
Mr. Harry Teal, R.R. #1, New Liskeard	N15	.001	<0.01	<0.01	0.22	<0.005	<0.01	<.02	6 140
Mr. Roy Taylor, R.R. #1, New Liskeard	N16	.001	<0.01	<0.01	0.06	<0.005	<0.01	<.02	*
Mr. Paul Field, R.R. #1, New Liskeard	N17	.001	<0.01	<0.01	0.16	<0.005	<0.01	<.02	5
Mr. Howard Foley, R.R. #1, New Liskeard	N18	<.001	<0.01	<0.01	0.07	<0.005	<0.01	<.02	6 30

HUDSON	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. Robert Cook, R.R. #1, New Liskeard	N19	<.001	<0.01	<0.01	<0.01	<0.005	<0.01	<.02	5
Mr. Tom McDermott, R.R. #1, New Liskeard	N20	<.001	<0.01	<0.01	0.26	<0.005	<0.01	<.02	6 50
Mr. Tracy Marriott, R.R. #1, New Liskeard	N21	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	5 23
Mr. Nick Phillips, R.R. #1, New Liskeard	N22	<.001	<0.01	<0.01	0.29	<0.005	<0.01	<.02	5
Mr. Harold Hodder, R.R. #1, New Liskeard	N23	<.001	<0.01	0.03	0.24	<0.005	<0.01	<.02	5 14
Mr. E. Walton, R.R. #1, New Liskeard	N24	<.001	<0.01	<0.01	0.01	<0.005	<0.01	<.02	5 6
Mr. Lee Huff, R.R. #1, New Liskeard	N25	.001	<0.01	<0.01	0.07	<0.005	<0.01	<.02	5 15
Mr. G.A. Breault, R.R. #1, New Liskeard	N26	<.001	<0.01	<0.01	0.87	<0.005	<0.01	<.02	6 50
Mr. Bonney, R.R. #1, New Liskeard	N27	.001	<0.01	<0.01	0.08	<0.005	<0.01	<.02	6
Mr. Raymond Plante, R.R. #1, New Liskeard	N28	<.001	<0.01	<0.01	<0.01	<0.005	<0.01	<.02	6 60
Mr. David Pauls, R.R. #1, New Liskeard	N29	.004	<0.01	<0.01	0.03	<0.005	<0.01	<.02	5 15
Mr. Pierre Lemieux, R.R. #1, New Liskeard	N30	<.001	<0.01	<0.01	<0.01	<0.005	<0.01	<.02	13
Mr. Leo Gauvreau, R.R. #1, New Liskeard	N31	<.001	<0.01	<0.01	0.19	<0.005	<0.01	<.02	5 13
Mr. Leslie Gray, R.R. #1, New Liskeard	N32	<.001	<0.01	<0.01	0.16	<0.005	<0.01	<.02	6 95
Mr. Peter Auger, R.R. #1, New Liskeard	N33	.001	<0.01	<0.01	4.7	<0.005	<0.01	<.02	6 80
Mr. Carl Smith, R.R. #1, New Liskeard	N34	.001	<0.01	<0.01	0.01	<0.005	<0.01	<.02	6 110
Mr. Arthur Greenwood, R.R. #1, New Liskeard	N35	.001	<0.01	<0.01	0.06	<0.005	<0.01	<.02	6 100
Mr. Arthur Greenwood, R.R. #1, New Liskeard	N36	.001	<0.01	<0.01	0.02	<0.005	<0.01	<.02	6 70
Mr. Eric Welch, R.R. #1, New Liskeard	N37	.001	<0.01	<0.01	0.19	<0.005	<0.01	<.02	5
Mr. Cliff Desrosiers, R.R. #1, New Liskeard	N38	<.001	<0.01	<0.01	0.02	<0.005	<0.01	<.02	5 9
Mr. John Veldhuis, R.R. #1, New Liskeard	N39	<.001	<0.01	<0.01	0.12	<0.005	<0.01	<.02	5 14
Mr. C. Smith, R.R. #1, New Liskeard	N40	<.001	<0.01	<0.01	0.12	<0.005	<0.01	<.02	5
Mr. Robert Wolfe, R.R. #1, New Liskeard	N41	<.001	<0.01	<0.01	0.06	<0.005	<0.01	<.02	5
Mr. D. Taylor, R.R. #1, New Liskeard	N42	<.001	<0.01	<0.01	0.16	<0.005	<0.01	<.02	5
Mr. Richard Spence & Bill Graydon, R.R. #1, New Liskeard	N43	.001	<0.01	<0.01	0.02	<0.005	<0.01	<.02	13
Mr. Jim Scott, R.R. #1, New Liskeard	N44	.001	<0.01	<0.01	0.08	<0.005	0.02	<.02	6
Mr. Roger Saudie & Charles Saudie, R.R. #1, New Liskeard	N46	<.001	<0.01	<0.01	0.07	<0.005	<0.01	<.02	*

HUDSON	Sample #	As	Co	Pb	Zn	Cd	Ni	Ag	D
Mr. William Greenwood, R.R. #1, New Liskeard	N48	<.001	<0.01	<0.01	0.06	<0.005	<0.01	<.02	6
Mr. Harold Edwards, R.R. #1, New Liskeard	N49	.002	<0.01	<0.01	0.04	<0.005	<0.01	<.02	6 68
Mr. Harold Edwards Sr., R.R. #1, New Liskeard	N50	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	6 65
Mr. W.K. Allen, R.R. #1, New Liskeard	N51	<.001	<0.01	<0.01	0.24	<0.005	<0.01	<.02	5
Mr. Murray Dumond, R.R. #1, New Liskeard	N52	<.001	<0.01	0.03	0.97	<0.005	<0.01	<.02	6
<u>LORRAINE</u>									
Mr. L. Willard, Box 83, North Cobalt	L62	<.001	<0.01	<0.01	0.19	<0.005	<0.01	<.02	5 12
Mr. Burt Simpson, North Cobalt	N55	<.001	<0.01	<0.01	0.02	<0.005	<0.01	<.02	3
Mr. Earl Carlin, North Cobalt	N56	<.001	<0.01	<0.01	4.5	<0.005	0.01	<.02	6
Mr. H. Vahey, North Cobalt	N57	<.001	<0.01	<0.01	0.06	<0.005	<0.01	<.02	3
Mrs. Irma Larocque, R.R. #1, North Cobalt	N58	.001	<0.01	<0.01	0.48	<0.005	<0.01	<.02	5(3)
Mr. Robert Bower, R.R. #1, Cobalt	N59	.004	<0.01	<0.01	0.10	<0.005	0.01	<.02	*
Mr. R. DeBoer, R.R. #1, North Cobalt	N60	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	5 20
Mr. D. MacDonald, R.R. #1, North Cobalt	N61	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	3
Mr. D. Thompson, R.R. #1, North Cobalt	N62	<.001	<0.01	<0.01	1.1	<0.005	0.02	<.02	3
Mr. L. Garrett, Box 188, North Cobalt	N63	<.001	<0.01	<0.01	0.04	<0.005	<0.01	<.02	3

APPENDIX III

Drinking Water Objective Levels and
Significance of Various Metals & Chemicals

Arsenic - MOE Drinking Water Rejection Level 0.05 mg/l

Arsenic is commonly found in nature as various minerals. It may be present in natural waters by the dissolution of these minerals, industrial discharges and pesticide application. The elements in its inorganic salts are highly toxic to humans and are known to exhibit carcinogenic properties especially in the aresnate form.

Since arsenic is eliminated from the body very slowly, it tends to accumulate, becoming concentrated in the nails, hair and skin. Hence the prolonged intake of water containing only minute quantities of arsenic may be a health hazard. For this reason, the maximum permissible concentration in domestic water supplies has been established at 0.05 mg/l with an objective of less than 0.01 mg/l.

Cadmium - MOE Drinking Water Objective Level 0.01 mg/l

All forms of cadmium are highly toxic, and once ingested are likely to remain in the body for a long time, becoming concentrated in the liver, kidneys and other organs. The water quality criteria for cadmium in domestic water supplies is 0.01 mg/l.

Cobalt - No maximum acceptable level

Cobalt is an essential element at trace levels for both animal and plant nutrition. Cobalt deficiency in man and animals results in a type of anaemia which may be corrected by administering small doses of cobalt chloride orally. Adverse effects due to cobalt are very slight even at high concentrations. No limits have been set on the maximum acceptable concentration for cobalt in domestic water supplies.

Lead - MOE Drinking Water Objective Level 0.05 mg/l

Lead is a very toxic element which tends to exchange with calcium and accumulate in bone marrow. Organic lead exerts its toxic effect on the nervous system within a very short time causing mental confusion, delirium, nausea, hallucinations, insomnia and convulsions. The maximum acceptable concentrations of lead in domestic water is 0.05 mg/l.

Nickel - No Maximum Acceptable Level

Nickel is more abundant in Ontario than anywhere else in the world. Nickel and its salts have generally proven to be non-toxic to man even at very high levels. Nickel sulphate and nickel bromide have even been used therapeutically as nervous sedatives for headaches, neuralgia and insomnia. No maximum acceptable concentration in domestic water supplies has been specified.

Silver - MOE Drinking Water Objective Level 0.05 mg/l

Silver is found in nature as the native metal. Exposure in industry is usually manifested as a condition referred to as argyria, with common symptoms including a permanent blue-gray discoloration of the skin and eyes. Although excessive exposure to silver may result in kidney, liver or spleen damage, no recognizable disturbances of health need accompany this condition. The maximum acceptable concentration of silver in domestic water supplies is 0.05 mg/l.

Zinc - MOE Drinking Water Objective Level 5.0 mg/l

Zinc and its compounds are relatively non-toxic when orally taken. Even at high concentrations, nausea and diarrhea are the only adverse effects likely to be encountered. The limiting factors which determine the acceptable maximum concentration in a water supply are taste and appearance. Zinc, in excess of 5.0 mg/l imparts a bitter astringent taste, a milky appearance in alkaline waters, and may cause a greasy film when the water is boiled. The maximum acceptable limit for domestic water supplies in Ontario is therefore 5.0 mg/l.

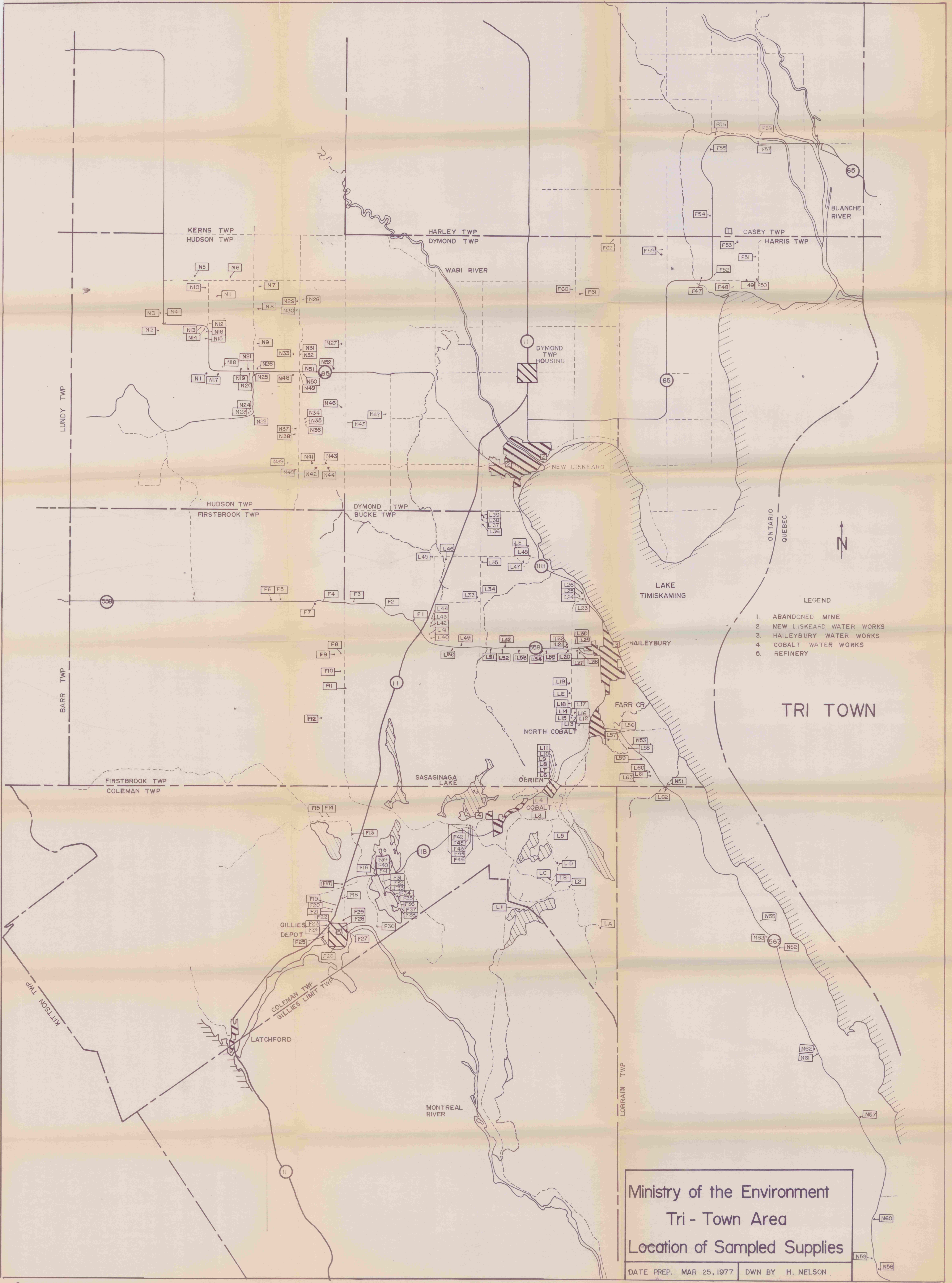
APPENDIX IV

LIST OF QUESTIONABLE PRIVATE WATER SUPPLIES

November 1976 Sampling

<u>Occupant</u>	<u># People Served</u>	<u>Arsenic Level Nov. '76</u>	<u>Type of Supply</u>	<u>Sample #</u>
<u>Bucke Township</u>				
Haddow	(2)	.002	400' drilled	F-3
Hermiston	(2)	.002	20' dug	L-59
Tesker	(5)	.001	dug	L-58
Beneke	(5)	.001	14' dug well	L-42
New Ont. Dynamics #3		.001	200' drilled	L-39
New Ont. Dynamics #2		.001	212' drilled	L-38
Cousins	(5)	.001	200' drilled	L-31
Hawkins	(2)	.002	dug well	L-23
Farrow	(4)	.001	dug well 12'	L-25
Polenz	(5)	.002	12' drilled	L-26
D. Evans	(12)	.004	6' dug	L-14
G. Evans	(7)	.001	2' dug	L-15
Boucher		.002	12' dug	L-9
<u>Casey Township</u>				
De Bernardi	(4)	.002	drilled	F-57
<u>Coleman Township</u>				
Stewart	(5)	.93	drilled	F-44
Lopley(ref.)	(2)	.037	drilled	F-25
McNickle (15 motel units)		.002	170' drilled	F-18
Caron	(4)	.001	27' sandpoint	F-17
Mercier	(9)	.001	spring	F-12
Montgomery	(2)	.001	68' drilled	F-46
Vigelow	(6)	.002	120' drilled	F-42
Carriere	(3)	.001	30' sandpoint	F-33
Dewer (2 dwellings)		.001	20' sandpoint	F-31
Hamilton	(2)	.002	lake supply (Gillies)	F-32
Pascoe	(5)	.002	spring	F-2
Price	(2)	.002	Lake Sasaginaga	L-3
Lieshman	(3)	.008	5' spring	L-5

<u>Occupant</u>	<u># People Served</u>	IV-2 Arsenic Level <u>Nov. '76</u>	<u>Type of Supply</u>	<u>Sample #</u>
<u>Dymond Township</u>				
LeGroux	(4)	.001	100' drilled	F-61
<u>Firstbrook Township</u>				
Clinker	(2)	.001	surface	F-6
Jenkins	(4)	.001	21' dug	F-10
Wright	(3)	.001	surface	F-5
Lafleur	(7)	.002	52' drilled	F-7
<u>Harris Township</u>				
Waugh	(2)	.037	20' dug	F-30
Laferriere	(2)	.020	15' dug	F-53
<u>Hudson Township</u>				
Carl	(5)	.001	90' drilled	N-2
Edwards Jr.	(7)	.002	68' drilled	N-49
Spence	(8)	.001	flowing	N-43
Teal	(4)	.001	140' drilled	N-15
Taylor	(6)	.001	?	N-16
Quehe	(6)	.001	200' drilled	N-11
Bumstead	(2)	.001	110' drilled	N-12
Morrow	(11)	.002	spring	N-6
Beland	(5)	.006	60' drilled	N-7
Foley	(5)	.004	80' drilled	N-8
<u>Lorraine Township</u>				
Bower	(6)	.004	?	N-59
Larocque	(2)	.001	spring	N-58



Ministry of the Environment
Tri - Town Area
Location of Sampled Supplies

DATE PREP. MAR 25, 1977 DWN BY H. NELSON

